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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/644,634	08/23/2000	Kanu G. Shah	60680-1407	1464

7590 12/23/2003

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EXAMINER	
BISSETT, MELANIE D	

ART UNIT	PAPER NUMBER
1711	

DATE MAILED: 12/23/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	09/644,634	SHAH ET AL.
	Examiner	Art Unit
	Melanie D. Bissett	1711

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *07 October 2003*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-50,52-57 and 59-61* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *39-45,60 and 61* is/are allowed.

6)☒ Claim(s) *1-38,46-47,49,52-54,56-57,59* is/are rejected.

7)☒ Claim(s) *48 and 55* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

13)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

a) ☐ The translation of the foreign language provisional application has been received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

1. The double patenting rejections have been withdrawn based on the applicant's filing of a terminal disclaimer. The prior art rejections have been altered to reflect the amendments.

Terminal Disclaimer

2. The terminal disclaimer filed on 9/3/03 disclaiming the terminal portion of any patent granted on this application which would extend beyond the expiration date of copending application 09/708,965 has been reviewed and is accepted. The terminal disclaimer has been recorded.

Claim Rejections - 35 USC § 103

3. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

4. Claims 1, 3, 5-17, 19, 22-30, 33-34, and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pellegri et al. in view of Ying et al.

5. From a prior Office action:

> Pellegri teaches an improved bipolar separator for electrochemical cells, where the cells may be used in fuel cells (abstract; col. 1 lines 7-11). The separators are substantially impermeable to diffusion of hydrogen, are rigid and are protected from discharge of anionic species (col. 2 lines 33-38). The separator plates are made by molding carbon, graphite, or metallic powder into a thermosetting resin (col. 2 lines 60-68). Insulating coatings for the separators include polyester, phenolic, furanic, and epoxide resins (col. 4 lines 44-53). The example shows a separator coated with a resin coating to a thickness of 200 μm, where the coating is cured with heat.
>
> Pellegri applies as above, teaching a coating layer of 200 μm but failing to teach a coating layer of less than about 150 μm thick. Because of the insulative properties of the coating, it is the

examiner's position that it would have been prima facie obvious to apply the coating at any thickness to balance cost and insulation properties of the cell structure.

Pellegri applies as above, failing to mention coatings cured by methods other than heating. Ying discloses a protective coating for separators in electrochemical cells, where a protective coating is applied to a microporous layer (abstract). The coating may be coated and cured by heat, UV light, visible light, infrared radiation, and electron beam radiation (col. 7 lines 48-55), and the separators may be used in fuel cell applications (col. 11 lines 9-15). Ying teaches combining an ethoxylated diacrylate with a urethane acrylate and a photosensitizer, coating the mixture at a thickness of 4 microns onto a substrate, and exposing the coating to UV lamps for 30 seconds to cure (example 1). The protective coatings enhance the flexibility and toughness of the separator (col. 13 lines 60-65). Therefore, it is the examiner's position that it would have been prima facie obvious to use the protective coatings of Ying's invention in Pellegri's electrochemical cells to improve the toughness of the separators.

Regarding claims 19 and 36, Pellegri discloses the combination of an epoxy resin with an aromatic amine hardener for the coating composition (col. 4 lines 44-50). It is the examiner's position that one of ordinary skill in the art would envision a multi-functional monomer by the mention of an aromatic amine hardener for epoxy resins.

6. Additionally, regarding the radiation exposure, it is the examiner's position that Ying's teaching of 30 seconds would be encompassed in the claimed range of "less than about 30 seconds". The "about" used in the claim allows for amounts slightly greater than 30 seconds, so the cure time of exactly 30 seconds would be "less than about 30 seconds". Also, it is the examiner's position that it would have been prima facie obvious to cure the coatings in any time sufficient to cure the coatings. Motivation for choosing shorter times would have been to improve the efficiency of production.

7. Claims 1, 3, 5-17, 22-30, and 33-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Breault et al. in view of Ying et al.

8. From a prior Office action:

Breault teaches a fuel cell assembly comprising a fibrous gas porous holder between a pair of gas impervious graphite plates (col. 2 line 64-col. 3 line 5). The reference teaches applying

an adhesive to the plate and curing the adhesive with heat (col. 6 lines 58-68), where the bond provides insulation (col. 7 lines 1-14).

Breault applies as above, failing to mention coatings cured by methods other than heating. Ying discloses a protective coating for separators in electrochemical cells, where a protective coating is applied to a microporous layer (abstract). The coating may be coated and cured by heat, UV light, visible light, infrared radiation, and electron beam radiation (col. 7 lines 48-55), and the separators may be used in fuel cell applications (col. 11 lines 9-15). Ying teaches combining an ethoxylated diacrylate with a urethane acrylate and a photosensitizer, coating the mixture at a thickness of 4 microns onto a substrate, and exposing the coating to UV lamps for 30 seconds to cure (example 1). The protective coatings enhance the flexibility and toughness of the separator (col. 13 lines 60-65). Therefore, it is the examiner's position that it would have been prima facie obvious to use the protective coatings of Ying's invention in Breault's electrochemical cells to improve the toughness of the separators.

9. Additionally, regarding the radiation exposure, it is the examiner's position that Ying's teaching of 30 seconds would be encompassed in the claimed range of "less than about 30 seconds". The "about" used in the claim allows for amounts slightly greater than 30 seconds, so the cure time of exactly 30 seconds would be "less than about 30 seconds". Also, it is the examiner's position that it would have been prima facie obvious to cure the coatings in any time sufficient to cure the coatings. Motivation for choosing shorter times would have been to improve the efficiency of production.

10. Claims 1-4, 6, 9-14, 17-25, and 28-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pellegri et al. in view of Boldt.

11. From a prior Office action:

Pellegri teaches an improved bipolar separator for electrochemical cells, where the cells may be used in fuel cells (abstract; col. 1 lines 7-11). The separators are substantially impermeable to diffusion of hydrogen, are rigid and are protected from discharge of anionic species (col. 2 lines 33-38). The separator plates are made by molding carbon, graphite, or metallic powder into a thermosetting resin (col. 2 lines 60-68). Insulating coatings for the separators include polyester, phenolic, furanic, and epoxide resins (col. 4 lines 44-53). The example shows a

separator coated with a resin coating to a thickness of 200 µm, where the coating is cured with heat.

Pellegri applies as above for the coated fuel cell plate and process of coating a fuel cell plate. However, the reference does not teach the applicant's claimed steps of screen printing and exposing the plate to at least two different wavelengths. Boldt teaches a method and composition for coating a gasket with a composition for providing improved sealing characteristics and storage life (col. 4 lines 37-44; col. 2 lines 19-24), where the coatings are screen printed (col. 1 lines 41-48) and exposed to two different ultraviolet wavelengths (col. 1 lines 63-66). Examples show a total cure time of 1.5 seconds (example 1). One coating composition comprises a urethane acrylic oligomer (acrylated oligomer), isobornyl acrylate monomer (mono-functional monomer), TMPEOTA (multi-functional monomer), polydimethylsiloxane (air-release agent), and a benzophenone/1-phenyl-1-2-hydroxy-2-methyl-1-propanone photoinitiator blend (example 5). Coating thicknesses are between 0.001 and 0.020 inches (~25-500 µm, col. 9 lines 1-6). Therefore, it is the examiner's position that it would have been prima facie obvious to use the gasket coating in Pellegri's invention to improve the sealing characteristics of the fuel cell plate.

Additionally, the reference suggests that the curing process causes the coating to adhere to the substrate (col. 8 lines 18-33). Therefore, any additive necessary to the cure process, such as the photoinitators used in Boldt's invention, would serve to promote adhesion in the coating.

12. Claims 46-47, 52-54, and 59 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shustack '387 in view of Clubley et al.

13. From a prior Office action:

Shustack discloses ultraviolet radiation-curable coating precursor compositions comprising 15-75% by weight of a bulky monomer, a urethane (meth)acrylate oligomer, an epoxy (meth)acrylate oligomer, and about 0.3-10% by weight of an acidic adhesion promoter (col. 2 lines 24-47). A preferred bulky monomer is mono-functional isobornyl acrylate (col. 5 lines 58-62), and several aliphatic acrylated urethane oligomers are noted for use in the invention (col. 6 line 29-col. 7 line 16). Multi-functional monomers such as multi-functional (meth)acrylates can be included (col. 10 lines 45-53). Photoinitiators are added when UV-curing is desired in an amount of 0.3-10% by weight of the coating composition (col. 9 lines 18-30). However, the reference does not teach the use of an air release agent in the coating composition. Clubley teaches anticorrosive compositions comprising a binder material and a corrosion inhibitor, where binders include polyurethanes, acrylic resins, and epoxy resins (col. 16 lines 22-34). The coatings can be used in can coating processes (col. 17 lines 41-52), and the reference notes polydimethylsiloxane as a conventional antifoaming agent to be used in the coating (col. 18 lines 42-58). Since Shustack notes the use of conventional additives such as slip agents, smoothing agents, and wetting agents

(col. 3 lines 64-68), it is the examiner's position that it would have been prima facie obvious to include an antifoaming agent such as polydimethylsiloxane in the can coatings of Shustack's invention. Motivation for including such an additive would have been to improve the antifoaming properties of the coating, thus improving appearance.

Also, Shustack teaches a broad range of oligomer weight composition, dependent on the desired extensibility and abrasion resistance properties (col. 6 lines 1-28). However, the reference does not teach the applicant's specific claimed weight ratios of the components. It is the examiner's position that it would have been prima facie obvious to use the components in the applicant's claimed ranges to optimize the extensibility and abrasion resistance of the coatings.

14. Regarding the added limitation "for coating a non-metallic substrate", it is the examiner's position that this limitation is an intended use limitation. Although the coatings of Shustack are drawn to coatings for metallic substrates, it is the examiner's position that the coatings also have the capability of use for non-metallic substrates.

15. Claims 49-50 and 56-57 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shustack '387 in view of Clubley et al. as applied to claims 46-47, 52-54, and 59 above, and further in view of Shustack '391.

16. From a prior Office action:

Shustack '387 and Clubley apply as above, noting the use of vinylic compounds such as acrylamide, vinyl pyrrolidone and other multi-functional (meth)acrylates (col. 10 lines 45-53), but failing to specify glycerol propoxy triacrylate as a multi-functional monomer. Shustack '391 teaches a similar curable coating incorporating multi-functional monomers, where the same compounds are mentioned (col. 12 lines 11-21). Additionally, Shustack '391 specifies glycerol propoxy triacrylate as a multi-functional acrylate equivalent to acrylamide or vinyl pyrrolidone in function. It is known in the art that multi-functional monomers provide cure ability in coating compositions, where curing improves cohesive strength. Because of the similarity of compositions and function, it is the examiner's position that it would have been prima facie obvious to include the multi-functional acrylate specified in Shustack '391 in the coating of Shustack '387 and Clubley to provide a coating having equally improved cure ability and cohesive strength.

Furthermore, Shustack '387 and Clubley do not specifically point to a photoinitiator blend of 1-phenyl-2-hydroxy-2-methyl-1-propanone and benzophenone, although benzophenone and hydroxy methyl phenyl propanone are both mentioned (col. 9 lines 18-30). Shustack '391 teaches that cleavage type photoinitiators such as hydroxymethylphenylpropanone and hydrogen

abstraction-type photoinitiators such as benzophenone can be used in the invention (col. 9 line 64-col. 10 line 14), where a combination of cleavage-type and hydrogen abstraction-type photoinitiators are used to optimize surface and through cures (col. 10 lines 34-37). Thus, it would have been prima facie obvious to choose a blend of hydroxymethylphenylpropanone and benzophenone for photoinitiators to sufficiently optimize the surface and through curing of the coatings of Shustack '387 and Clubley.

Allowable Subject Matter

17. Claims 48 and 55 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

18. Claims 39-45 and 60-61 are allowed.

19. From a prior Office action:

> The closest prior art, Boldt (USPN 5,667,227-A), teaches a coating composition comprising a UV-curable coating for a gasket comprising a urethane acrylic oligomer, isobomyl acrylate monomer, a multi-functional monomer, a polydimethylsiloxane air release agent, and a benzophenone/1-phenyl-1-2-hydroxy-2-methyl-1-propanone photoinitiator blend. However, the reference does not teach the use of both aliphatic acrylated urethane oligomers and epoxy acrylate oligomers or the use of adhesion promoters such as methacrylated polyols. It is the examiner's position, therefore, that the combination of methacrylated polyol adhesion promoters with the applicant's claimed coating precursor components would provide a novel, unobvious step over the prior art. It is also the examiner's position that the combination of aliphatic acrylated urethane oligomers and epoxy acrylate oligomers in a coating on a fuel cell plate would provide a novel, unobvious step over the prior art.

Response to Arguments

20. The rejections have been altered to reflect the present amendments.

21. In response to the applicant's arguments that there is no motivation to combine the Ying reference with Pellegri or Breault, it is noted that the examiner has provided the motivation from the references. Ying teaches that the inventive coatings have improved

toughness; therefore, the use of such coatings in the inventions of Pellegri or Breault would result in tougher coatings.

22. Regarding the applicant's arguments that the primary references use different methods to overcome warpage problems than the applicant or Ying, it is noted that the references are concerned with the same field of endeavor; i.e. coatings for separator plates. Thus, the references are analogous. Further, it is noted that the fact that applicant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985). In this case, Ying has discovered coatings having improved toughness. One of ordinary skill in the art would look to combine Ying with Pellegri or Breault to improve the toughness of the coatings.

23. In response to the applicant's arguments that the primary references teach away from the use of radiation-polymerized coatings by teaching the use of hardeners or low-temperature heat-curable coatings, it is noted that such teachings do not teach away from the use of radiation-polymerized coatings. Although the primary references teach certain coatings for the invention, they do not exclude coatings having improvements therein. The mere preference for one type of coating does not teach away from the use of an improved coating. Ying has provided a teaching of a coating having improved properties and would therefore be combinable with the primary references.

24. Regarding the arguments drawn to Sasaki et al., it is noted that the rejection of paragraphs 17-18 are clearly drawn to the combination of Pellegri et al. and Boldt. The

citation of Sasaki et al. in paragraph 16 appears to be a typographical error. The examiner's response to arguments using Pellegri et al. can be found in the above paragraphs 21-23. Pellegri teaches the use of a non-porous substrate.

25. In response to the applicant's arguments that the amendment limiting the coating to a coating for a non-metallic substrate overcome the rejection of Shustack and Clubley, it is noted that such a limitation is an intended use limitation. Thus, any coating capable of coating a non-metallic substrate would anticipate this limitation. The applicant has not provided evidence to show that the coatings of Shustack and Clubley would not be capable of coating a non-metallic substrate. Since the claim does not reflect any material differences between the claimed coatings and the coatings of the prior art, the rejection has been maintained.

Conclusion

26. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any

extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Melanie D. Bissett whose telephone number is (571) 272-1068. The examiner can normally be reached on M-F 8-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, James Seidleck can be reached on (571) 272-1078. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

mdb

RABON SERGENT
PRIMARY EXAMINER